

Crash Course in Chemistry!

- Protons = positive charge
- Electrons = negative charge
- Neutrons = neutral (no charge)

- Protons and neutrons are found in nucleus
 - Most of the atom's mass is in the nucleus
- Electrons form a cloud around the nucleus

- Atomic number = # of protons
 - # of protons makes each element unique
 - In a neutral atom
 - # of protons = # of electrons
- Atomic mass = mass of the atom
 - Remember, most of the mass is in the nucleus
- Mass # = number of particles in the nucleus
 - Round the atomic mass
 - Reveals protons AND neutrons
 - To get neutrons, subtract atomic # from mass #

- Note-Isotopes
 - Have same number of protons but different number of neutrons
 - Have same atomic # but different mass #

Practice:

Nitrogen

- Atomic # = 7
- Mass # = 14

- # Protons =
- # Neutrons =
- # Electrons =

Lithium

- Atomic # = 3
- Mass # = 7

- # Protons =
- # Neutrons =
- # Electrons =

Carbon

- Atomic # = 6
- Mass # = 12 or 14

- # Protons =
- # Neutrons =
- # Electrons =

- Electron distribution for first 3 energy levels
 - First energy level can hold up to 2 electrons
 - Second energy level can hold up to 8 electrons
 - Third energy level-we won't use examples beyond 8 electrons
- Electrons must fill inner levels before moving to higher energy levels
- Valence electrons = electrons in outermost energy level
 - Chemical behavior of atom depends on number of valence electrons
 - Elements in the same group (column) of the Periodic Table have the same number of valence electrons
 - Therefore they have similar chemical behavior
- Elements are more stable when their outermost energy level of electrons is full
 - Thus elements are stable (unreactive/inert) when they have 8 valence e-
 - Exceptions: Hydrogen and helium
 - They only use the first energy level which can only hold 2 e-
- Elements with one or more unpaired electrons are reactive
- Atoms will bond with other atoms to become more stable
 - Note: The interaction is between the valence electrons of each atom
 - Atoms can only gain or lose *electrons*
 - Changing protons = different element!
 - Ions (and ionic bonds) are formed from the transfer of electrons
 - Cation = positive ion
 - Less electrons than protons
 - Typically form when atom has 1 or 2 valence electrons
 - "Donate" the extra electron(s)
 - Anion = negative ion
 - More electrons than protons
 - Typically form when atom has 7 valence electrons
 - "Take on" an extra electron
 - Covalent bonds result from the sharing of electrons
 - Nonpolar covalent = equal sharing
 - Polar covalent = unequal sharing due to differences in electronegativity

Practice:

1. Determine the number of protons, neutrons, and electrons for a neutral atom of each of the following elements
2. Next, draw their electron distribution diagram in the space to the right
3. Then, record the number of valence electrons
4. Finally, determine if they are stable as is, if they typically form anions, or if they typically form cations

Helium

- Atomic # = 2
- Mass # = 4
- # Protons =
- # Neutrons =
- # Electrons =
- # Valence Electrons =
- Stable, Anion, or Cation

Chlorine

- Atomic # = 17
- Mass # = 35
- # Protons =
- # Neutrons =
- # Electrons =
- # Valence Electrons =
- Stable, Anion, or Cation

Sodium

- Atomic # = 11
- Mass # = 23
- # Protons =
- # Neutrons =
- # Electrons =
- # Valence Electrons =
- Stable, Anion, or Cation

Fluorine

- Atomic # = 9
- Mass # = 19
- # Protons =
- # Neutrons =
- # Electrons =
- # Valence Electrons =
- Stable, Anion, or Cation

Neon

- Atomic # = 10
- Mass # = 20
- # Protons =
- # Neutrons =
- # Electrons =
- # Valence Electrons =
- Stable, Anion, or Cation

Beryllium

- Atomic # = 4
- Mass # = 9
- # Protons =
- # Neutrons =
- # Electrons =
- # Valence Electrons =
- Stable, Anion, or Cation

